Package ‘WRS2’

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Description
A collection of robust statistical methods based on Wilcox’ WRS functions. It implements t-tests (independent and dependent samples), ANOVA (including between-within subject designs) and nonparametric ANCOVA models based on robust location measures.
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Author Patrick Mair [cre, aut],
Rand Wilcox [aut],
Felix Schoenbrodt [ctr]
Maintainer Patrick Mair <mair@fas.harvard.edu>
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Description

A user-friendly version of Wilcox’ robust statistics functions (WRS package). It implements the most important robust tests as described in Rand Wilcox book "Introduction to Robust Estimation and Hypothesis Testing".

Details

Package: WRS2
Type: Package
Version: 0.3-2
Date: 2015-07-23
License: GPL-2
The WRS2 package provides wrapper functions for the WRS package such that these functions can be applied in a user-friendly manner. It interfaces various functions in the WRS package in terms of easy-to-use input arguments and corresponding S3 methods for presenting the output. Several robust ANOVA and ANCOVA functions have been implemented so far. Additional functions will be added subsequently.

Author(s)

Maintainer: Patrick Mair (<mair@fas.harvard.edu>)

References


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ancova  Robust ANCOVA

Description

This function computes robust ANCOVA for 2 independent groups and one covariate. It compares trimmed means. No parametric assumption (e.g. homogeneity) is made about the form of the regression lines. A running interval smoother is used. A bootstrap version which computes confidence intervals using a percentile t-bootstrap is provided as well.

Usage

ancova(formula, data, tr = 0.2, fr1 = 1, fr2 = 1, pts = NA)

ancboot(formula, data, tr = 0.2, nboot = 599, fr1 = 1, fr2 = 1, pts = NA)

Arguments

- formula an object of class formula.
- data an optional data frame for the input data.
- tr trim level for the mean.
- fr1 values of the span for the first group (1 means unspecified)
- fr2 values of the span for the second group (1 means unspecified)
- pts can be used to specify the design points where the regression lines are to be compared; if NA design points are chosen.
- nboot number of bootstrap samples
Value

Returns an object of class ancova containing:

- **evalpts**: covariate values (including points close to these values) where the test statistic is evaluated
- **n1**: number of subjects at evaluation point (first group)
- **n2**: number of subjects at evaluation point (first group)
- **trdiff**: trimmed mean differences
- **se**: standard errors for trimmed mean differences
- **ci.low**: lower confidence limit for trimmed mean differences
- **ci.hi**: upper confidence limit for trimmed mean differences
- **test**: values of the test statistic
- **crit.vals**: critical values
- **p.vals**: p-values
- **fitted.values**: fitted values from interval smoothing
- **call**: function call

References


See Also

- `t2way`

Examples

```r
head(invisibility)
ancova(mischief2 ~ cloak + mischief1, data = invisibility)

## specifying covariate evaluation points
ancova(mischief2 ~ cloak + mischief1, data = invisibility, pts = c(3, 4, 8, 1))

## bootstrap version
ancboot(mischief2 ~ cloak + mischief1, data = invisibility)
```
Description

In the TV show "I’m a celebrity, get me out of here" the celebrities had to eat things like stick insects, fish eyes, etc. This dataset records the time taken to retch when eating these things.

Usage

bush

Format

A data frame with 5 variables and 8 observations:

<table>
<thead>
<tr>
<th>participant</th>
<th>participant ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>stick_insect</td>
<td>time taken to retch when eating a stick insect</td>
</tr>
<tr>
<td>kangaroo_testicle</td>
<td>time taken to retch when eating a kangaroo testicle</td>
</tr>
<tr>
<td>fish_eye</td>
<td>time taken to retch when eating a fish eye</td>
</tr>
<tr>
<td>witchetty_grub</td>
<td>time taken to retch when eating a witchetty grub</td>
</tr>
</tbody>
</table>

Details

Dataset from Field et al. book (p. 557).

References


Examples

bush
summary(bush)
**bwtrim**  
*A robust two-way mixed ANOVA using trimmed means.*

**Description**

The `bwtrim` function computes a two-way between-within subjects ANOVA on the trimmed means. It allows for one between subjects variable and one within subjects variable. The functions `sppba`, `sppbb`, and `sppbi` compute the main fixed effect, the main within-subjects effect, and the interaction effect only, respectively, using bootstrap. For these 3 functions the user can choose an M-estimator for group comparisons.

**Usage**

```r
bwtrim(formula, id, data, tr = 0.2)
tsplit(formula, id, data, tr = 0.2)
sppba(formula, id, data, est = "mom", avg = TRUE, nboot = 500, MDIS = FALSE)
sppbb(formula, id, data, est = "mom", nboot = 500)
sppbi(formula, id, data, est = "mom", nboot = 500)
```

**Arguments**

- **formula**: an object of class formula.
- **id**: subject ID.
- **data**: an optional data frame for the input data.
- **tr**: trim level for the mean.
- **est**: Estimate to be used for the group comparisons: either "onestep" for one-step M-estimator of location using Huber’s Psi, "mom" for the modified one-step (MOM) estimator of location based on Huber’s Psi, or "median".
- **avg**: If TRUE, the analysis is done by averaging K measures of location for each level of the fixed effect, and then comparing averages by testing the hypothesis that all pairwise differences are equal to zero. If FALSE the analysis is done by testing whether K equalities are simultaneously true.
- **nboot**: number of bootstrap samples.
- **MDIS**: if TRUE the depths of the points in the bootstrap cloud are based on Mahalanobis distance, if FALSE a projection distance is used.

**Details**

The `tsplit` function is doing exactly the same as `bwtrim`. It is kept in the package in order to be consistent with older versions of the Wilcox (2012) book.

For `sppba`, `sppbb`, and `sppbi` the analysis is done based on all pairs of difference scores. The null hypothesis is that all such differences have a typical value of zero. In the formula interface it is required to provide full model.
**Value**

`bwtrim` returns an object of class "t2way" containing:

- **Qa**: first main effect
- **A.p.value**: p-value first main effect
- **Qb**: second main effect
- **B.p.value**: p-value second main effect
- **Qab**: interaction effect
- **A.p.value**: p-value interaction effect
- **call**: function call
- **varnames**: variable names

`sppba`, `sppbb`, and `sppbi` returns an object of class "spp" containing:

- **test**: value of the test statistic
- **p.value**: p-value

**References**


**See Also**

`t2way`

**Examples**

```r
## data need to be on long format
pictureLong <- reshape(picture, direction = "long", varying = list(3:4), idvar = "case", timevar = c("pictype"), times = c("couple", "alone"))
colnames(pictureLong)[4] <- "friend_requests"

## 2-way within-between subjects ANOVA
bwtrim(friend_requests ~ relationship_status*pictype, id = case, data = pictureLong)

## between groups effect only (MOM estimator)
sppba(friend_requests ~ relationship_status*pictype, case, data = pictureLong)

## within groups effect only (MOM estimator)
sppbb(friend_requests ~ relationship_status*pictype, case, data = pictureLong)

## interaction effect only (MOM estimator)
sppbi(friend_requests ~ relationship_status*pictype, case, data = pictureLong)
```
chile

Chile Heat and Length

Description

Originally from pepperjoe.com, this dataset contains the name, length, and heat of chiles. Heat is measured on a scale from 0-11. (0-2 ... for sissys, 3-4 ... sort of hot, 5-6 ... fairly hot, 7-8 ... real hot, 9,5-9 ... torrid, 9,5-11 ... nuclear).

Usage

chile

Format

A data frame with 3 variables and 85 observations:

- name: name of the chile
- length: length in cm
- heat: heat of the chile

References


Examples

summary(chile)

electric

The Electric Company

Description

These data are based on an educational TV show for children called “The Electric Company”. In each of four grades, the classes were randomized into treated (TV show) and control groups (no TV show). At the beginning and at the end of the school year, students in all the classes were given a reading test. The average test scores per class were recorded.

Usage

electric
Format

A data frame with 5 variables and 192 observations:

- City: Fresno and Youngstown
- Grade: grade
- Pretest: reading scores at the beginning of the semester
- Posttest: reading scores at the end of the semester
- Group: treatment vs. control

References


Examples

summary(electric)

eurosoccer

European Soccer Leagues

description

Contains various team stats from five European soccer leagues (2008/09 season).

Usage

eurosoccer

Format

A data frame with 11 variables and 96 teams:

- League: Country
- Team: Team
- Games: Number of games
- Won: Games won
- Tied: Games tied
- Lost: Games lost
- GoalsScored: Goals scored
- GoalsConceded: Goals conceded
- GoalDifference: Goal difference
- Points: Final amount of points
- GoalsGame: Goal scored per game
**Beer Goggles Effect**

**Description**

This dataset is about the effects of alcohol on mate selection in night-clubs. The hypothesis is that after alcohol had been consumed, subjective perceptions of physical attractiveness would become more inaccurate (beer-goggles effect). There are 48 participants: 24 males, 24 females. The researcher took 3 groups of 8 participants to a night club. One group got no alcohol, one group 2 pints, and one group 4 pints. At the end of the evening the researcher took a photograph of the person the participant was chatting up. The attractiveness of the person on the photo was then evaluated by independent judges.

**Usage**

```r
goggles
```

**Format**

A data frame with 3 variables and 48 observations:

- **gender**: 24 male, 24 female students
- **alcohol**: amount of alcohol consumed
- **attractiveness**: attractiveness rating (0-100)

**Details**

Dataset from Field et al. book (p. 501).

**References**


**Examples**

```r
goggles
summary(goggles)
```
Description

In a study on the effect of consuming alcohol, hangover symptoms were measured for two independent groups, with each subject consuming alcohol and being measured on three different occasions. One group consisted of sons of alcoholics and the other was a control group.

Usage

chile

Format

A data frame with 4 variables and 120 observations:

- symptoms: number of hangover symptoms
- group: son of alcoholic vs. control
- time: measurement occasion
- id: subject ID

References


Examples

summary(hangover)

Description

We are interested in the effect that wearing a cloak of invisibility has on people’s tendency to mischief. 80 participants were placed in an enclosed community. Hidden cameras recorded mischievous acts. It was recorded how many mischievous acts were conducted in the first 3 weeks (mischief1). After 3 weeks 34 participants were told that the cameras were switched off so that no one would be able to see what they’re getting up to. The remaining 46 subjects were given a cloak of invisibility. These people were told not to tell anyone else about their cloak and they could wear it whenever they liked. The number of mischievous acts were recorded over the next 3 weeks (mischief2).
**Usage**

`invisibility`

**Format**

A data frame with 3 variables and 80 observations:

- `cloak` factor with 34 subjects in the no cloak condition, 46 in the cloak condition
- `mischief1` number of mischievous acts during the first 3 weeks
- `mischief2` number of mischievous acts during the second 3 weeks

**Details**

Fictional dataset from Field et al. book (p. 485).

**References**


**Examples**

```r
invisibility
summary(invisibility)
```

---

**med1way**

*Heteroscedastic one-way ANOVA for medians.*

**Description**

This function computes a one-way ANOVA for the medians. Homoscedasticity assumption not required. There shouldn't be too many ties.

**Usage**

```r
med1way(formula, data, iter = 1000)
```

**Arguments**

- `formula` an object of class formula.
- `data` an optional data frame for the input data.
- `iter` number of iterations.
Value

Returns an object of class `med1way` containing:

- `test`: value of the test statistic
- `crit.val`: critical value
- `p.value`: p-value
- `call`: function call

References


See Also

t1way, t1waybt

Examples

```r
med1way(libido ~ dose, data = viagra)
```

Description

This function computes a two-way ANOVA medians with interactions effects.

Usage

```r
med2way(formula, data)
```

Arguments

- `formula`: an object of class formula.
- `data`: an optional data frame for the input data.

Value

Returns an object of class `t2way` containing:

- `Qa`: first main effect
- `A.p.value`: p-value first main effect
- `Qb`: second main effect
- `B.p.value`: p-value second main effect
- `Qab`: interaction effect
- `AB.p.value`: p-value interaction effect
- `call`: function call
- `varnames`: variable names
References


See Also

t2way, med1way

Examples

med2way(attractiveness ~ gender*alcohol, data = goggles)

---

movie  

Movies and Aggressive Affect

Description

Participants are randomly assigned to one of two groups. The first group watches a violent film, and the other watches a nonviolent film. Afterwards, the aggressive affect is measured, and it is desired to compare three groups, taking gender and degree into account as well.

Usage

movie

Format

A data frame with 4 variables and 68 observations:

degree  no degree vs. degree
gender  36 males, 32 females
type  violent vs. nonviolent
aggressive  aggressive affect

Details

Artificial dataset from Wilcox book (p. 316).

References


Examples

movie

summary(movie)
Description

This dataset examines how the profile pictures on social network platforms affect the number of friend requests when females are in a relationship. The relationship status is a between-subject variable (part of the participants did set their status to relationship). For the first 3 weeks the subjects had a picture of their own in their profiles. For the following 3 weeks they posted a picture with a man.

Usage

picture

Format

A data frame with 4 variables and 40 observations:

case  subject id
relationship_status  Relationship status on social network platform
couple  amount of friend requests when profile picture as couple
alone  amount of friend requests when profile picture as single

Details

Dataset from Field et al. book (p. 644).

References


Examples

picture
summary(picture)
Pygmalion  
Pygmalion Data

Description

The Pygmalion effect is the phenomenon where higher expectations lead to an increase in performance. For instance, when teachers expect students to do well and show intellectual growth, they do; when teachers do not have such expectations, performance and growth are not so encouraged and may in fact be discouraged in a variety of ways. This dataset contains reasoning IQ scores of children. For the experimental group, positive expectancies had been suggested to teachers after the pretest. For the experimental group, no expectancies had been suggested after the pretest. For both groups we have reasoning IQ posttest scores. The dataset is taken from Elashoff and Snow (1970).

Usage

Pygmalion

Format

A data frame with 3 variables and 114 observations:

Pretest pretest score  
Posttest posttest score  
Group treatment vs. control

References


Examples

summary(Pygmalion)

rmanova  
A heteroscedastic one-way repeated measures ANOVA for trimmed means.

Description

The rmanova function computes a one-way repeated measures ANOVA for the trimmed means. Homoscedasticity assumption not required. Corresponding post hoc tests can be performed using rmmcp.
rmanova

Usage

rmanova(y, groups, blocks, tr = 0.2)
rmmcp(y, groups, blocks, tr = 0.2)

Arguments

y       a numeric vector of data values (response).
groups  a vector giving the group of the corresponding elements of y.
blocks  a vector giving the block of the corresponding elements of y.
tr      trim level for the mean.

Value

rmanova an object of class "t1way" containing:
test     value of the test statistic
df1      degrees of freedom
df2      degrees of freedom
p.value  p-value
call     function call

rmmcp returns an object of class "mcp1" containing:
comp     inference for all pairwise comparisons
fnames   names of the factor levels

References


See Also

med1way, t1way

Examples

head(WineTasting)
rmanova(WineTasting$Taste, WineTasting$Wine, WineTasting$Taster)

## post hoc
rmmcp(WineTasting$Taste, WineTasting$Wine, WineTasting$Taster)

head(bush)
require(reshape)
bushLong <- melt(bush, id.var = "participant", variable_name = "food")
rmanova(bushLong$value, bushLong$food, bushLong$participant)

## post hoc
rmanovab

A heteroscedastic one-way repeated measures bootstrap ANOVA for trimmed means.

Description
The rmanova function computes a bootstrap version of the one-way repeated measures ANOVA for the trimmed means. Homoscedasticity assumption not required. Corresponding post hoc tests can be performed using pairdepb.

Usage
rmanovab(y, groups, blocks, tr = 0.2, nboot = 599)
pairdepb(y, groups, blocks, tr = 0.2, nboot = 599)

Arguments
y        a numeric vector of data values (response).
groups   a vector giving the group of the corresponding elements of y.
blocks   a vector giving the block of the corresponding elements of y.
tr        trim level for the mean.
nboot     number of bootstrap samples.

Value
rmanovab an object of class "rmanovab" containing:
test      value of the test statistic
crit      critical value
call      function call

pairdepb returns an object of class "mcp2" containing:
comp      inference for all pairwise comparisons
fnames    names of the factor levels

References

See Also
rmanova
**Description**

The `runmean` implements a running interval smoother on the trimmed mean, `rungen` uses general M-estimators, `runmbo` performs interval smoothing on M-estimators with bagging.

**Usage**

```
runmean(x, y, fr = 1, tr = 0.2)
rungen(x, y, fr = 1, est = "mom")
runmbo(x, y, fr = 1, est = "mom", nboot = 40)
```

**Arguments**

- `x`: a numeric vector of data values (predictor)
- `y`: a numeric vector of data values (response)
- `fr`: smoothing factor (see details)
- `tr`: trim level for the mean
- `est`: type of M-estimator ("mom", "onestep", or "median")
- `nboot`: number of bootstrap samples

**Details**

The larger the smoothing factor, the stronger the smoothing. Often the choice \( fr = 1 \) gives good results; the general strategy is to find the smallest constant so that the plot looks reasonably smooth.

**Value**

Returns the fitted values.

**References**


**See Also**

`ancova`
Examples

```r
## trimmed mean smoother
fitmean <- runmean(Pygmalion$Pretest, Pygmalion$Posttest)
## MOM smoother
fitmest <- rungen(Pygmalion$Pretest, Pygmalion$Posttest)
## median smoother
fitmed <- rungen(Pygmalion$Pretest, Pygmalion$Posttest, est = "median")
## bagged onestep smoother
fitbag <- runmbo(Pygmalion$Pretest, Pygmalion$Posttest, est = "onestep")

## plot smoothers
plot(Pygmalion$Pretest, Pygmalion$Posttest, col = "gray", xlab = "Pretest", ylab = "Posttest",
     main = "Pygmalion Smoothing")
orderx <- order(Pygmalion$Pretest)
lines(Pygmalion$Pretest[orderx], fitmean[orderx], lwd = 2)
lines(Pygmalion$Pretest[orderx], fitmest[orderx], lwd = 2, col = 2)
lines(Pygmalion$Pretest[orderx], fitmed[orderx], lwd = 2, col = 3)
lines(Pygmalion$Pretest[orderx], fitbag[orderx], lwd = 2, col = 4)
legend("topleft", legend = c("Trimmed Mean", "MOM", "Median", "Bagged OneStep"), col = 1:4, lty = 1)
```

---

**spider**  
*Arachnophobes*

Description

24 arachnophobes were used in all. 12 were asked to play with a big hairy tarantula spider with big fangs and an evil look. Their subsequent anxiety was measured. The remaining 12 were shown only picture of the same hairy tarantula. Again, the anxiety was measured.

Usage

`spider`

Format

A data frame with 2 variables and 24 observations:

- `group`: picture vs. real spider
- `anxiety`: anxiety measure

Details

Dataset from Field et al. book (p. 362).

References

Examples

spider

---

**swimming**

*Optimistic and Pessimistic Swimmers*

**Description**

At a swimming team practice, all participants were asked to swim their best event as far as possible, but in each case the time that was reported was falsified to indicate poorer than expected performance (i.e., each swimmer was disappointed). 30 min later, they did the same performance. The authors predicted that on the second trial more pessimistic swimmers would do worse than on their first trial, whereas optimistic swimmers would do better. The response is ratio = Time1/Time2 (> 1 means that a swimmer did better in trial 2).

**Usage**

swimming

**Format**

A data frame with 4 variables and 58 observations:

- **optim** Optimists and pessimists
- **sex** Gender of the swimmer
- **event** Swimming event: freestyle, breaststroke, backstroke
- **ratio** Ratio between the swimming times

**References**


**Examples**

summary(swimming)
**t1way**

*A heteroscedastic one-way ANOVA for trimmed means.*

**Description**

The `t1way` function computes a one-way ANOVA for the medians. Homoscedasticity assumption not required. It uses a generalization of Welch’s method. Corresponding post hoc tests can be performed using `lincon`.

**Usage**

```r
t1way(formula, data, tr = 0.2)
lincon(formula, data, tr = 0.2)
```

**Arguments**

- `formula`: an object of class `formula`.
- `data`: an optional data frame for the input data.
- `tr`: trim level for the mean.

**Details**

In the post hoc computations, confidence intervals are adjusted to control FWE, but p-values are not adjusted to control FWE.

**Value**

`t1way` returns an object of class "t1way" containing:

- `test`: value of the test statistic (F-statistic)
- `df1`: degrees of freedom
- `df2`: degrees of freedom
- `p.value`: p-value
- `call`: function call

`lincon` returns an object of class "mcp1" containing:

- `comp`: inference for all pairwise comparisons
- `fnames`: names of the factor levels

**References**


**See Also**

`med1way`, `t1waybt`
Examples

t1way(libido ~ dose, data = viagra)

## post hoc tests
lincon(libido ~ dose, data = viagra)

\[
\text{t1waybt} \quad \text{Bootstrap version of the heteroscedastic one-way ANOVA for trimmed means.}
\]

Description

Test the hypothesis of equal trimmed means using a percentile t bootstrap method. Corresponding post hoc tests are provided in mcppb20.

Usage

t1waybt(formula, data, tr = 0.2, nboot = 599)
mcppb20(formula, data, tr = 0.2, nboot = 599, crit = NA)

Arguments

- formula: an object of class formula.
- data: an optional data frame for the input data.
- tr: trim level for the mean.
- nboot: number of bootstrap samples.
- crit: critical significance value.

Value

Returns an object of class t1waybt containing:

- test: value of the test statistic
- p.value: p-value
- Var.Explained: explained amount of variance
- Effect.Size: effect size
- nboot.eff: effective number of bootstrap samples
- call: function call

mcppb20 returns an object of class "mcp1" containing:

- comp: inference for all pairwise comparisons
- fnames: names of the factor levels
References

See Also
t1way, med1way

Examples
t1waybt(libido ~ dose, data = viagra)

## post hoc
mcppb20(libido ~ dose, data = viagra)

t2way Anova for trimmed means, M-estimators, and medians.

Description
The t2way function computes a two-way ANOVA for trimmed means with interactions effects. Corresponding post hoc tests are mcp2a.m. pbad2way performs a two-way ANOVA using M-estimators for location with mcp2a for post hoc tests.

Usage
t2way(formula, data, tr = 0.2)
pbad2way(formula, data, est = "mom", nboot = 599)
mcp2atm(formula, data, tr = 0.2)
mcp2a(formula, data, est = "mom", nboot = 599)

Arguments
formula an object of class formula.
data an optional data frame for the input data.
tr trim level for the mean.
est Estimate to be used for the group comparisons: either "onestep" for one-step M-estimator of location using Huber's Psi, "mom" for the modified one-step (MOM) estimator of location based on Huber's Psi, or "median".
nboot number of bootstrap samples.

Details
pbad2way returns p-values only.
Value

The functions t2way and pbad2way return an object of class t2way containing:

- **QA** first main effect
- **A.p.value** p-value first main effect
- **QB** second main effect
- **B.p.value** p-value second main effect
- **QAB** interaction effect
- **AB.p.value** p-value interaction effect
- **Call** function call
- **Varnames** variable names

The functions mcp2atm and mcp2a return an object of class mcp containing:

- **Effects** list with post hoc comparisons for all effects
- **Contrasts** design matrix

References


See Also

t1way, med1way

Examples

```r
# 2-way ANOVA on trimmed means
t2way(attractiveness ~ gender*alcohol, data = goggles)

# post hoc tests
mcp2atm(attractiveness ~ gender*alcohol, data = goggles)

# 2-way ANOVA on MOM estimator
pbad2way(attractiveness ~ gender*alcohol, data = goggles)

# post hoc tests
mcp2a(attractiveness ~ gender*alcohol, data = goggles)

# 2-way ANOVA on medians
pbad2way(attractiveness ~ gender*alcohol, data = goggles, est = "median")

# post hoc tests
mcp2a(attractiveness ~ gender*alcohol, data = goggles, est = "median")

# extract design matrix
model.matrix(mcp2a(attractiveness ~ gender*alcohol, data = goggles, est = "median"))
```
A three-way ANOVA for trimmed means.

Description
This function computes a three-way ANOVA for trimmed means with all interactions effects.

Usage
t3way(formula, data, tr = 0.2)

Arguments

formula an object of class formula.
data an optional data frame for the input data.
tr trim level for the mean.

Value
Returns an object of class t3way containing:

Qa first main effect
A.p.value p-value first main effect
Qb second main effect
B.p.value p-value second main effect
Qc third main effect
C.p.value p-value third main effect
Qab first two-way interaction effect
AB.p.value p-value first two-way interaction effect
Qac second two-way interaction effect
AC.p.value p-value second two-way interaction effect
Qbc third two-way interaction effect
BC.p.value p-value third two-way interaction effect
Qabc three-way interaction effect
ABC.p.value p-value three-way interaction effect
call function call
varnames variable names

References
trimse

See Also
t1way, t2way

Examples
t3way(aggressive ~ degree*gender*type, data = movie)

---

trimse

Robust location measures and their standard errors (se).

Description

The following functions for estimating robust location measures and their standard errors are provided: winmean for the Winsorized mean, winse for its se, trimse for the trimmed mean se, msmedse for the median se, mest for the M-estimator.

Usage

winmean(x, tr = 0.2, na.rm = FALSE)
winse(x, tr = 0.2)
trimse(x, tr = 0.2, na.rm = FALSE)
msmedse(x, sewarn = TRUE)
mest(x, bend = 1.28, na.rm = FALSE)

Arguments

x a numeric vector containing the values whose measure is to be computed.
tr trim lor Winsorizing level.
na.rm a logical value indicating whether NA values should be stripped before the computation proceeds.
sewarn a logical value indicating whether warnings for ties should be printed.
bend bending constant for M-estimator.

Details

The standard error for the median is computed according to McKean and Shrader (1984).

References

Examples

```r
## Self-awareness data (Dana, 1990): Time persons could keep a portion of an
## apparatus in contact with a specified range.
self <- c(77, 87, 88, 114, 151, 210, 219, 246, 253, 262, 268, 296, 299, 306, 376,
         428, 515, 666, 1310, 2611)
mean(self, 0.1)  ## .10 trimmed mean
trimmean(self, 0.1)  ## se trimmed mean
winmean(self, 0.1)  ## Winsorized mean (.10 Winsorizing amount)
winse(self, 0.1)  ## se Winsorized mean
median(self)  ## median
msmedse(self)  ## se median
mest(self)  ## Huber M-estimator
```

---

viagra  

Effects of Viagra

Description

Participants were assigned randomly to three viagra dosages (placebo, low dosage, high dosage). The dependent variable was an objective measure of libido.

Usage

```r
viagra
```

Format

A data frame with 2 variables and 15 observations:

```r
dose viagra dosage
libido objective measure of libido
```

Details

Artificial dataset from Field et al. book (p. 401).

References


Examples

```r
viagra
```
Wine Tasting

Description

In this hypothetical dataset we have three types of wine (A, B and C). We asked 22 friends to taste each of the three wines (in a blind fold fashion), and then to give a grade of 1 to 7. We asked them to rate the wines 5 times each, and then averaged their results to give a number for a person's preference for each wine.

Usage

WineTasting

Format

A data frame with 3 variables and 66 observations:

<table>
<thead>
<tr>
<th>Taste</th>
<th>Taste Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wine</td>
<td>Wine (A, B, C)</td>
</tr>
<tr>
<td>Taster</td>
<td>Taster (index)</td>
</tr>
</tbody>
</table>

Examples

WineTasting
summary(WineTasting)

yuen

Independent samples t-tests on robust location measures.

Description

The function yuen performs Yuen’s test for trimmed means, yuenbt is a bootstrap version of it. The pb2gen function performs a t-test based on various robust estimators.

Usage

yuen(formula, data, tr = 0.2)
yuenbt(formula, data, tr = 0.2, nboot = 599)
pb2gen(formula, data, est = "mom", nboot = 599)
Arguments

- `formula`: an object of class formula.
- `data`: an optional data frame for the input data.
- `tr`: trim level for the mean.
- `nboot`: number of bootstrap samples.
- `est`: Estimate to be used for the group comparisons: either "onestep" for one-step M-estimator of location using Huber's Psi, "mom" for the modified one-step (MOM) estimator of location based on Huber's Psi, or "median", "mean".

Value

Returns objects of classes "yuen" or "pb2" containing:

- `test`: value of the test statistic (t-statistic)
- `p.value`: p-value
- `conf.int`: confidence interval
- `df`: degrees of freedom
- `diff`: trimmed mean difference
- `call`: function call

References


See Also

t1way,t1waybt

Examples

```r
## Yuen's test
yuen(Angiety ~ Group, data = spider)

## Bootstrap version of Yuen's test (symmetric CIs)
yuenbt(Angiety ~ Group, data = spider)

## Using an M-estimator
pb2gen(Angiety ~ Group, data = spider, est = "mom")
pb2gen(Angiety ~ Group, data = spider, est = "mean")
pb2gen(Angiety ~ Group, data = spider, est = "median")
```
Paired samples $t$-test on trimmed means.

Description

The function `yuen` performs Yuen’s test for trimmed means, `yuenbt` is a bootstrap version of it. The `pb2gen` function performs a t-test based on various robust estimators.

Usage

`yuend(x, y, tr = 0.2)`

Arguments

- `x`: an numeric vector of data values (e.g. for time 1).
- `y`: an numeric vector of data values (e.g. for time 2).
- `tr`: trim level for the means.

Details

The test statistic is a paired samples generalization of Yuen’s independent samples t-test on trimmed means.

Value

Returns an object of class "yuen" containing:

- `test`: value of the test statistic (t-statistic)
- `p.value`: p-value
- `conf.int`: confidence interval
- `df`: degrees of freedom
- `diff`: trimmed mean difference
- `call`: function call

References


See Also

`yuen`

Examples

```r
# Cholesterol data from Wilcox (2012, p. 197)
before <- c(190, 210, 300, 240, 280, 170, 280, 250, 240, 220)
after <- c(210, 210, 340, 190, 260, 180, 200, 220, 230, 200)
yuend(before, after)
```
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